

Chapter 4: Base Load Measures

4.0 Base Load Measures

Base load measures are those energy-conservation measures which impact the dwelling's base load (i.e., non-heating) energy usage. These measures may include, but are not limited to:

- 4.1 Water heater replacement
- 4.2 Domestic hot water treatments
- 4.3 Refrigerator and freezer replacement or removal
- 4.4 Lighting retrofits

4.1 Water Heater Replacement

Energy conservation water heater replacements typically occur for conversions to natural gas from another fuel type or if the existing water heater is very inefficient.

Observe the following standards for all water heater replacements or removals:

1. Turn off and disconnect fuel supply to existing water heater.
2. Turn off water supply to existing water heater.
3. Drain water from tank by attaching a hose to the drain valve and extend the end of the hose to the floor drain.
4. Disconnect water piping from inlet and outlet sides.
5. Remove existing water heater and properly dispose.

Observe the following standards for water heater installations:

1. Install water heater in a stable location. Provide strapping to secure the water heater, if needed.
2. Install a temperature and pressure-relief (TPR) valve with piping installed as required by local code.
3. Ensure venting meets NFPA 54 for gas units.
4. Install a shut-off valve on the inlet side for future servicing.
5. Ensure that water lines do not leak after connection to water heater.

6. Fill tank with water before turning water heater on.
7. Measure and adjust temperature settings to 120° F as necessary.
8. Affix a tag to the water heater identifying who the customer should call for service. Display the tag prominently, and confirm that it includes the service provider's name, address and telephone number.

4.1.1 ENERGY STAR® Gas Power-Vented Water Heater Installations

1. Follow the manufacturer's instructions to ensure a proper venting system.
2. Install GFCI outlet for electrical connection.
3. Confirm there are no gas leaks in any of the gas piping.
4. Install a proper sediment trap on gas line, if none exists.
5. Ensure bonding of the gas piping system meets NFPA 54 if it contains any CSST.
6. Install properly sized gas piping when converting from electric.
7. A UL listed appliance connector may be used to connect gas valve to gas piping.
8. Measure and adjust gas pressure to meet manufacturer's specifications.
9. Follow manufacturer's instructions for the proper removal of condensate.
10. Test for carbon monoxide (CO) level in the exhaust vent, to confirm that the CO level is less than 200 ppm air free.

4.2 Domestic Hot Water Treatments

4.2.1 Water Saving Showerheads and Aerators

1. Remove existing showerheads and aerators with flows above 1.5 gallons per minute, and recycle replaced items appropriately.
2. Install the new showerhead, using thread-seal tape or other pipe sealant to prevent leakage. Avoid over-tightening the new showerhead.
3. Protect the curved chrome showerhead nipple from damage during installation, using cloth or leather between the jaws of the pipe wrench or pliers.
4. When replacing faucet aerators, be careful to avoid scratching or deforming them.
5. Be cautious when significant deposits exist on the devices as this could lead to fixture damage and additional costs.

4.2.2 Water Heater Pipe Insulation

1. FOR MOBILE HOMES ONLY: Insulate hot and cold water pipes within 6 feet of the water heater unless the water heater is located in a closet that is accessed from the outside. For exterior closets, insulate all water piping.
2. Insulate all pipes on the circulating loop between the boiler and the indirect domestic hot water storage tank.
3. Use pipe insulation rated at R-2 or better. Insulate elbows, unions and other fittings to the same thickness that you insulate the straight pipe runs.
4. Keep pipe insulation at least 3 inches away from combustion vent pipe, unless it has a fire-safety rating for closer clearance.
5. Use the correct size of insulation sleeve for the water pipe diameter.
6. Secure seams, joints, and ends of pipe sleeves.

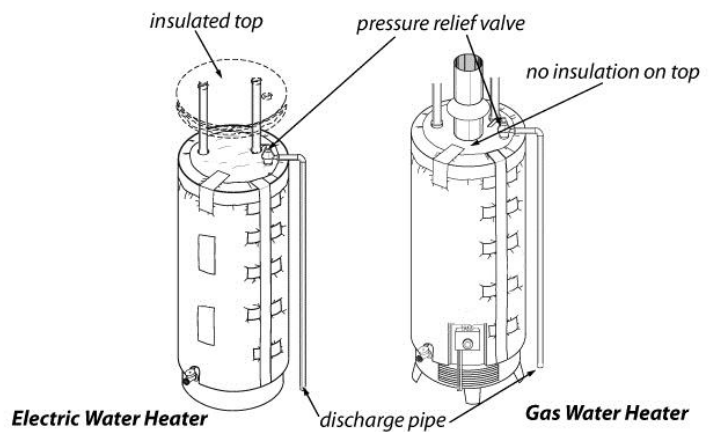
4.2.3 Water Heater Tank Insulation

Water heater tank insulation will not be installed on any water heater that:

- is not in safe operating condition,
- is leaking,
- does not pass minimum draft requirements
- has a vent damper present, or
- the manufacturer prohibits installation of additional insulation.

When installing water heater tank insulation:

1. Install the insulation to the bottom of the existing water tank. The drain valve is located at the bottom of the tank to use as guide.
2. Do not cover draft diverters, pressure-relief valve (PRV), thermostats, or high-limit switch with insulation or tape.
3. Install an extension pipe to



Water heater insulation: Insulation should be installed carefully so it doesn't interfere with the burner, elements, thermostats, draft diverter, or pressure relief valve.

the PRV if none is present. Do not add on to existing piping to address non-compliant code issues. If CPVC piping is used, confirm that the extension pipe is rated for the proper temperatures.

4. Use at least two straps or zip-ties to secure the blanket. Do not overly compress the insulation.
5. Install insulation that will increase overall tank insulation to R-10. Gas water heaters are often insulated to R7 and will require only R3 to be added.

Gas and oil-fired water heaters

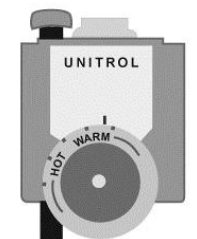
1. Keep insulation at least 2 inches away from controls, burner parts, and the burner access panel.
2. Do not insulate the tops of gas-fired or oil-fired water heaters.

Electric water heaters

1. Insulate the top of the water heater.
2. Cut back and remove insulation at access doors for heating elements and their controls. Use tape to secure cut edges of insulation to the water heater.
3. Do not cover the access panels with straps for holding insulation in place.

4.2.4 Setting Water Temperature

1. Measure the hot water temperature at the faucet nearest to the water heater, and reduce the water heater temperature to 120° F with customer permission.
2. Mark the current setting on the thermostat, and move the control to a lower temperature. Note the difference between electric and gas controls shown here.
3. On electric water heaters, set the upper thermostat and lower thermostat to the same temperature. Shut off power to the water heater before opening thermostat access panels.



Gas water heater control



Electric water heater control

4.3 Refrigerator or Freezer Replacement and Removal

Prior to installing the replacement unit:

1. Install replacement units only in locations covered under the manufacturer's warranty. Units can be installed in a non-conditioned space if allowed by the manufacturer.

2. Confirm the replacement unit will fit in the existing opening without modifications. Modify the opening only with customer approval.
3. Verify that door openings are wide enough to accommodate the new unit.
4. For units that do not meet standard replacement guidelines, confirm the customer file contains the required waiver documentation.

When replacing a refrigerator or freezer:

1. Install the replacement unit level, for proper operation. Raise the front of a refrigerator slightly to allow the doors to close slowly and without assistance or with limited assistance from the customer.
2. Unless limited by the existing installation space, install all the parts and trim per the manufacturer's specifications.
3. Plug the unit into the nearest receptacle, and confirm that the unit functions. Do not plug into an extension cord. The outlet should not be on a ground fault interrupter circuit.
4. Change the swing on doors, if necessary to meet the needs of the customer.
5. Verify that the doors are properly aligned and seal tightly with a positive gasket seal.
6. De-manufacture and properly dispose of existing units being removed or replaced. Do not disable the existing unit until you install the replacement and confirm that it works properly.

4.4 Lighting

Compact fluorescent lamps (CFLs) typically use 75 percent less electricity than standard incandescent bulbs. CFLs should be selected that provide equivalent light output (lumen and color) to prevent customer removal and promote safety.

Halogen torchiere lamps pose a health and safety risk due to the heat generated by the halogen bulb. Replacing these lamps with fluorescent models eliminates the health and safety risk and reduces electrical usage.

When replacing lighting:

1. Demonstrate a CFL and explain the related electric savings potential for customers unsure about replacing incandescent bulbs with CFLs.
2. Select replacement CFLs and its wattage that match the lumen output and functionality of the existing incandescent bulb. Obtain permission to



install a non-equivalent CFL from the customer. Confirm customer satisfaction with both task lighting and background lighting.

3. Install all CFLs — CFLs will not be left for the customer to install.
4. Install CFLs by grasping the plastic base – never the glass tubing.
5. Turn each CFL on after installation to confirm that it works properly.
6. Replace halogen torchiere lamps with fluorescent torchiere lamps when appropriate, and remove halogen torchiere lamps from residence. Properly dispose of halogen torchiere lamps.



If a CFL breaks, take care in cleaning up. Even though the amount of mercury is very small, EPA recommends the following steps:

1. Open nearby windows to disperse any vapors and leave the room for 15 minutes.
2. Carefully scoop up the fragments and powder with stiff paper or cardboard and seal them in a plastic bag.
3. Wipe the area clean with damp paper towels and place them in the plastic bag.
4. Do not use a vacuum or broom to clean up the broken bulb on hard surfaces.
5. Place all cleanup materials in a sealed plastic bag.
6. Place the bag in a second sealed plastic bag and place it in an outdoor trash container. Note: Broken and unbroken CFLs should be taken to a recycling center if possible.
7. Wash your hands after disposing of the bag.

If a fluorescent bulb breaks on a rug or carpet, do your best to remove all visible materials using the steps above. Use sticky tape such as duct tape to help you pick up the small pieces and powder. If you need to vacuum after all visible materials have been removed, remove the vacuum bag (or empty and wipe the canister) and place the bag or vacuum debris in two sealed plastic bags and dispose of at your local recycling center.

Final Inspection and Quality Assurance Standards

Acceptable installations for mobile home measures should reflect the standards in the previous chapters in addition to the standards below.

Water Heater Replacement

1. Replacement is ENERGY STAR® where applicable and meets Energy Factor (EF).
2. Follows protocol for water heater replacement and was properly modeled with the energy audit.
3. Unit is properly sized for the household.
4. Follows manufacturer's specifications for installation including venting, pressure relief, drain tube, and electrical connection.
5. New outlet (receptacle) is GFCI as required by code.
6. Temperature measured 120-125 degrees, unless owner request documented.
7. Eligible units were insulated with a blanket (if possible).
8. Remaining unit is not leaking, back-drafting, or eligible for an electric conversion.

Water-Reduction Devices

1. Installation follows Weatherization policies and protocol.
2. New aerators and showerheads do not leak.

Refrigerators

1. Installation meets the manufacturer's specifications.
2. All parts and trim are present and installed as designed.
3. Unit is properly sized for the household.
4. Doors are properly aligned, and there is a positive seal with gasket.
5. The new refrigerator is installed as close to level as possible.
6. The replacement refrigerator is an ENERGY STAR® model.
7. The most energy-inefficient unit was replaced.
8. Old refrigerators have been removed from the dwelling and recycled properly.
9. Replacement refrigerator follows Wisconsin policies and protocol.
10. The customer file contains a waiver for any unit that falls outside of replacement guidelines.

Final Inspection and Quality Assurance Standards

Freezers

1. Installation meets the manufacturer's specifications.
 - a. Unit is not installed in a non-conditioned space (garage, porch) unless allowed by the manufacturer.
2. All parts and trim are present as designed.
3. Replacement freezer size is equal to or less than unit or units replaced.
4. Lid is properly aligned, and there is a positive seal with gasket.
5. The replacement freezer is an ENERGY STAR® model with manual defrost.
6. The most energy inefficient unit was replaced.
7. The old freezer has been removed from the dwelling and recycled properly.
8. Replacement freezer follows Weatherization policies and protocol.
9. Additional functional units were removed with owner's permission.

Lighting: CFLs

1. Follows protocol from Weatherization policies and protocol.
2. Replacement bulbs are appropriate for the intended use.
3. No uninstalled CFLs left at job site.
4. All halogen torchiere lamps were replaced.